

with Robert Young's Compl.

ADDRESS

TO

MEDICAL STUDENTS,

IN THE

UNIVERSITY OF GLASGOW,

30th October, 1883.

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GENTLEMEN,

When it was last my duty, now thirteen years ago, to welcome a former generation of students to this University, to this building, it was to what we then deemed spacious halls. We had just left the venerable building in the High Street—a noble specimen of Caroline architecture, and Caroline oblivion of promises to pay. It seemed as if we were to be for some time at ease and in comfort, but our hopes did not long endure. We are now groaning over defective accommodation, and realising the fact that the Scottish baronial style is singularly inelastic even among stone buildings. It is not merely that our numbers have increased with unexpected rapidity; the development of new methods of teaching and new branches of study is on a scale and demands an amount of space to which no clue existed fifteen years ago. Do not deem our predecessors to have been deficient in foresight. The recently extended medical school of a sister University is barely finished before there, too, signs of overcrowding are apparent; and still the number increases of intrants to the medical profession. It is not for me to find fault with this steadily increasing influx, of which I confess my inability to understand the reason. But be the profession overstocked or not, whether the numbers are too great or only badly distributed, the competition is yearly keener, the struggle greater, whether to achieve the lowest qualifications or to earn a living which shall be something more than a bare pittance. You have selected the profession of medicine from a variety of motives, into which I need not inquire, certain that none of you possessed of an ordinary share of modesty has been tempted by the speedy prospect of wealth. But whatever your motive, let me impress on you the saying of James Syme, the revered teacher of more than one on this platform. "There are some persons born deficient in honesty; if there is any gentleman here who happens to have this misfortune I would advise him not to be a surgeon." To you who are at the threshold of the profession I would put this question, for the discipline which Syme expressed by honesty, the self-control which should keep you to your duty as it kept him, must be exercised by you now, must accompany your daily life as students and as practitioners, wherever and under however unpleasant conditions you may have to live. Nathaniel Hawthorne, in his strange story of Dr Rapucini's Daughter, suggests an ordeal to which each one of you must submit, though the world may not exact it. A physician, one of those Italian followers of Paracelsus, who, still alchemist, trusted to the potency

of drugs over unknown conditions of mind and body, of health and disease, and who were therefore ever in quest of new preparations and of subjects whereon to experiment, is thus spoken of by his rival Baglioni, an orthodox Professor of Padua:—"That the signor doctör does less mischief than might be expected with such dangerous substances is undeniable. Now and then it must be owned he has effected, or seemed to effect, a marvellous cure; but, to tell you my private mind, Signor Giovanni, he should receive little credit for such instances of success—they being probably the work of chance—but should be held strictly accountable for his failures, which may be justly considered his own work."—*Mosses from an Old Manse*. Somehow this strict account of failures has to be taken, and the result of the reckoning will depend in great measure on the way in which you spend the next few years of your student life. Much public misapprehension exists as to the medical student and his doings, but the popular hero is as extinct as his contemporary Mrs Gamp. In the 30 odd years which, alas, include my medical life, studies, hard studies have grown up around the student's path with a speed which has cut him off from all possibility of reckless roystering; he has no time for it, barely time for the legitimate recreation which is indispensable to health. If one of your number breaks with his surroundings, and seeks to rival the imaginary prodigals of St Bartholomew's, he will assuredly mark his tardy progress to a degree by unsuccessful examinations, the saddest memorials of misused opportunities.

I propose to lay before you, as briefly as may be, a sketch of your work so that you may understand how wide is the scope of the subjects to be looked into in the short time at your disposal, and that those who are not conversant with the business of a medical school may learn what provision the University ought to make so as to facilitate as much as possible the hard labours of its medical students. Formerly, when the medical men were few and the knowledge needed proportionately small, apprenticeship gave all the instruction required. The profession admitted its pupils at proper intervals to their own grade, safe against overcrowding and competition, because they had a trade monopoly and a territorial monopoly protected by strict penal regulations. Teachers scarcely even in the same sense as the great artists whose studios were frequented by watchful disciples, patterns rather for their apprentices to copy in the most literal way, their functions have been modified, their monopoly gradually abolished, till now the corporations stand in contrast to the universities. There has arisen, not much encouraged by either, a third group, the extra-academical teachers, men who, in most instances, would be on the strength of a German university. Let me explain

for the benefit of those who are more familiar with the methods adopted elsewhere than in Scotland, that the body of men to whom I refer—men who voluntarily add the function of teachers to their heavy work as practitioners—is vastly different from the tutors or coaches with whom a London lecturer thinks it necessary to reckon. The coach's calling is an unsuccessful one in Scotland; no one here, if advocating the propriety of allowing students to come up for examination in some subjects at an earlier date than is permitted by our fixed examination periods—and I personally am not averse to the plan—would think of urging it on the ground that the tutor and his pupil would find it their interest to time the period of examination so as to secure the best prospect of passing. Such an argument is based on the theory that a student's business is to get through rather than that he should acquire the knowledge which will entitle him to get through. The majority of you will be called on, in your future lives, to act on your own responsibility, away from the comforting but not always useful consultation of a fellow-practitioner. You must be prepared to deal with diseases and injuries which your hospital and dispensary attendance have not made you familiar with. For such surprises he is best prepared who has accurate anatomy, sound general principle, and presence of mind. The last cannot be acquired, though it may be cultivated; but he who lacks it will never practice either with comfort or success. The acquisition of sound principles is only open to him who has not merely accepted the teaching of the authorities, but accepted them intelligently, because he knew and could follow the reasoning by which the conclusion was arrived at. Unless he can do this, the future medical practitioner is a handicraft worker who follows the rules of the Faculty as they did in Moliere's time, and, let us hope, "does far less mischief than might have been expected." A few years ago we heard a great deal about the impropriety, nay the evil, of burdening the medical student with the elementary sciences. The suggestion was made by a prominent man of science; immediately a host of people less known to fame took up the cry. A distinguished physiologist shortly after went so far as to grudge the time spent on Anatomy; and just the other day a pathologist said Physiology had no interest except in its relation to Pathology. It seemed odd to attempt to curtail the studies of the universities because someone had invented a grievance against them. When the anti-science cry was raised the number of the medical students at Universities was increasing, as they assuredly would not have done on the hypothesis of general dissatisfaction, for there were and are plenty of places where licenses could be obtained without science. But medical reformers are somewhat variable; those who formerly denounced science now vie with

each other in urging its advantages to the study of medicine, and we who have quietly gone on with our work are almost made to appear as if we were kept up to the mark by our vacillating critics. I shall in the sequel point out how Biology and Chemistry are essential to him who would form just views of modern Pathology, above all if he wishes to verify or advance the researches on which the presently dominant opinions are based. But let me first speak of Anatomy, the basis of practice. Far too little time is given to it nowadays. It is not enough to dissect the body once and fancy that you have done all that is necessary; books, plates, casts, and spirit-sodden preparations sufficing thereafter to maintain the knowledge you deem adequate. This has not been the opinion or the practice of surgeons of the highest standing, some of whom, albeit they kept up a practical acquaintance with human anatomy as nearly as possible under the aspect which the parts would present in the living subject, have thought it right to prepare specially for important operations by rehearsing the region with which they were about to deal. The too brief time given to this groundwork of medicine and surgery might be advantageously extended at the cost of that premature hospital attendance to which junior students are prone. There is no more use for a student of painting to sit and watch a greater painter at work before he has learned to draw and to use his colours and brushes than there is for a second-year student who has just entered on a course of systematic Surgery to go into the hospital after one course of Anatomy and stare at what he can neither understand nor recall. Mr Spence, afterwards professor of Surgery in Edinburgh, insisted on us, his dressers, continuing in the dissecting room in our third year of study, and in our fourth employed some of us on dissections in which he himself shared. The importance of subsequent work cannot be pleaded as justifying neglect of anatomy. The diagnosis of a case of obscure nervous disease demands from physician or physiologist intimate anatomical knowledge, without which he might as well write conjectures on slips of paper and draw them out of a hat. It is most satisfactory to find some of the London teachers urging the importance to Physiology of more careful anatomical study. But to remove all excuse from students for further neglect, additional accommodation is needed for the anatomical department, a need to which I shall again refer.

Belonging, as I do, to the pre-reformation epoch, I must confess that much of modern Physiology is beyond me; even the apparatus so largely used to enforce biological principles is unfamiliar. The chemical aspect of the science has an extent and precision undreamt of even a short time ago, and the single test which sufficed the clinical clerk to estimate chlorides in the

urine is as antiquated as the practice of sending that fluid "to the wise woman." Nor does the need of chemical knowledge end here. Pathological Chemistry has rightly acquired much prominence, and is provided for, as far as may be, in the Western Infirmary. But a serious difficulty arises of which no solution has as yet been devised. Every one admits the importance of chemistry except those who think the Universities should compete with the Corporations by granting license on the same number of subjects. But it is forgotten that necessarily this difficult subject is presented at the threshold of the curriculum to young men who have had no previous acquaintance with it. The regulations are based on the hypothesis that six months' systematic lectures, and three months of a practical class, include a time in which sufficient Chemistry can be learned. It is obvious that the greater part of the six months must be taken up by the average student in familiarising himself with elementary matters, and that it is impossible for him to follow intelligently a teacher if he attempts to go over the leading points of inorganic and organic Chemistry, the latter dealing with most complicated changes going on inside as well as outside the body under very dissimilar conditions. If before entering the medical classes a pupil could acquire a knowledge of chemical terminology, knew the meaning of acids and bases, and could work out a question of combining proportions, he would be in a position to profit by even a brief systematic course, after which his attention would be specially directed to the methods of Physiological Chemistry. The schools, however, do not give much science teaching of the kind needed, unless in large towns where a few institutions are properly equipped, and the Examiners for the Science and Art Department put the matter very clearly a few years ago when they practically said that there was no science teaching worthy of the name. Perhaps the short service men who annually take small doses of science at South Kensington may have inaugurated a new era, but their influence has not yet become apparent. Failing this preparatory teaching, the work inside of the University would be advantaged if the teaching were extended by the addition of a specially qualified demonstrator, who should act under the professor for it seems a mistake to share the teaching of one subject between two independent and equal teachers. If such a post assumed the form of a fellowship, of a reward to a medical graduate, the assistance rendered would be great to the fellow and to the university. Here is a field in which a medical reformer might by success make a name as a benefactor. It would surely be a worthier object of ambition to strive for such regulations or endowments as shall secure to students the best possible opportunities of learning matters germane to their daily duties

than to intrigue for seats at a beard. But Chemistry is not the only quarter in which, if our imaginary reformer is anxious to do good, he may find scope for his energies. The Anatomy department needs expansion, if more prolonged attention is to be given to the subject, as every surgeon and, I think, most physicians here present will support me in declaring necessary. If a professorship of Pathology is endowed—and I hope some old pupil will emulate the noble example of Sir Erasmus Wilson, who regarded infirmary teaching, however excellent, as a makeshift from the University point of view—if, I say, such a chair should be created, for that too museum and laboratory accommodation will be needed. Other studies which must be followed out practically, whether by the more ambitious students of medicine or by the students of Biology, lack that completeness of accommodation enjoyed elsewhere, in buildings more recently erected and therefore arranged with special reference to the present phase of medical and scientific research. Even some of the classes have overflowed their limits, and must either be divided or find some larger hall. Even that it is difficult to find. The new buildings, the completion of which we owe to the liberality of the citizens, the Marquis of Bute, and Mr Randolph whose generosity has enabled us to connect the central building with the north and south blocks, include a hall which, now completed, should not be profaned by a lesser ceremony than an inaugural one. The Lower Hall of the Museum has been taken in part (let us hope only for a time, since the Upper Hall is already overcrowded) to provide a reading room in connection with the library. Our meeting to-day is only possible by the temporary lodgment of an important examination in another chamber. But much has been done with the space at our disposal, and remembering that the best work in the past was not done in laboratories fitted up like the man's coat in "Happy Thoughts," with a pocket for everything, remembering that Darwin, E. Forbes, and Huxley, not to speak of their predecessors, did excellent zoological work at sea in accommodation as like that of the Challenger as the galley in a Mediterranean orange brig is to the space given in a P. and O. steamer to the cook—bearing this in mind, I say, let me explain that whatever else is added, *space* is the first requirement for the health and work of our numerous students. It is not necessary that all I speak of should be done at once, but all has to be provided sooner or later if Glasgow is to main its present reputation. But more than space is needed. I have said that a Professor of Pathology is still lacking, though the teaching in both infirmaries provides means of fulfilling the ordinance. Other departments, too, besides Chemistry, require additional teaching aid. A great deal

has been said about a scheme of General Council bursaries. So far as the Medical Faculty is concerned I, speaking for myself, strongly object to it. If these bursaries are to be limited to the Arts Faculty, good and well; my colleagues will doubtless have good reason for accepting them. But in medicine we need no baits for entrants. the few bursaries we have are now rewards for work done in college. Of such rewards we need more; only let them assume the form of fellowships or scholarships tenable for a term of years, and held on condition of teaching within the University after graduation. These are the posts which men would work hard for, and which they would gladly hold on a tenure of hard work. Such *privat docenten* would become a strength to the Medical School. Some such posts there are, the Black, the Clarkes, the Arnott and Thomson, the Muirhead; an increase in their number would benefit not the holders merely, but the University and the profession.

I need say nothing, in resuming my sketch, of the curriculum of Surgery, Physic, and the other technical subjects which have been spoken of unwisely as practical in contradistinction to the scientific studies. The form of these courses is stereotyped, though learning, eloquence, and fertility of illustration may skilfully keep the student abreast of the latest work, especially when a gifted teacher supplements his prelections by the laboratory work, the clinical study of disease. But in addition to this clinical work, something more is needed. The future practitioner who, immediately after passing, may have the responsibility of a varied practice in his hands, should have an opportunity of learning what it is to act on his own account. In connection with Anderson's College, house-visiting was arranged for to be conducted by students under control of the Andersonian dispensary officers. I only speak from my own experience, and as Dr Gairdner, though then a systematic and clinical lecturer with a large following, was not one of my teachers I may say that I learned my Practice of Physic Surgery and gynecology better by visiting the sick poor in their homes than by clinical ward work or reading. It is true that we were then not so constantly under the examination harrow, and did not grudge the time for such daily visits and the relative reading. I mention this, however, only incidentally. The University, as such, cannot provide dispensary visitation, but some of the charities outside may yet perhaps be induced to secure this; for, looking back to those old days, I affirm it was a boon to the very poor. Even if a student visitor was not very skilful, there was a human sympathy in the visit of a stranger from another sphere which soothed the helpless poor. It is of Pathology I would like to speak somewhat more fully, as by it I may best impress on you the

range of study which must be compassed by your teachers or by you, before that fascinating subject can be fairly within your grasp. The aspect of Pathology has greatly altered within the last twenty years: it is now passing through a phase, *pari passu* with Biology, in which speculation has somewhat outrun observation. Formerly lesions not traumatic were held to be normal functions misdirected, perversions of function, while even the disturbances following traumatic lesions were assigned to the products formed in the wound which caused disturbance by chemical change or by the abnormal cellgrowth they established wherever they were carried by the blood. Now the list is large and is daily increasing of epidemic and endemic diseases said to be due to the presence in the body of germs, whose growth and decline coincide with those of the disease. Pasteur, the distinguished French chemist, has shown in his enquiries into the diseases of wine, silk worms, and the domestic animals what may be accomplished by that infinite power of taking pains which is the essence of genius. Without a commercial object in view, unaided moreover by that State endowment of whose indispensableness we hear so much, Lister experimentally established the share which atmospheric impurities of the organic kind take in the disorganisation of albuminous fluids. Whatever be the ultimate fate of the great surgeon's application of his hard-won results, it is a matter of congratulation to us that the most important enunciation of his views dates from this University. These are the names most familiar to the general public, but Chauveaux, Toussant, Galtier, Lewis, Cunningham, Koch, Klein, Paul Bert, are entitled to recognition as observers whose untiring assiduity and marvellous resource have given an enormous importance to the methods they have after many failures developed. Hoyle embodies a very wide principle under the quaint phrase, "Winning tricks is not necessarily proof of good play;" you must keep in mind that failure is not always loss, and though the conclusions arrived at by these observers should undergo extensive modification before they are translated into practice, their memory will remain as benefactors to Biology by the methods they have elaborated. Far be it from me to suggest a comparison between the methods and aims of the earlier and later works; but the analogy, remote though it be, has to be kept in mind. The alchemists are now-a-days laughed at, in their own day they dominated science, and ruled with no gentle hand. Yet their errors were the quarry out of which Chemistry as it now is was contructed; without their nostrums modern therapeutics would not now be so far advanced. It is true that those fathers of Chemistry and medicine were learned, but their learning was not that of the closet merely. In those days a scholar had to know

clearly not only what he thought about the classical authors he studied, but also how his thoughts crossed or coincided with the opinions of his day. No mere textual critics or speculative historians or philosophers, they fought in an arena which at times might be the scene of gratifying triumphs, at other times the altar on which the unpopular disputant might be sacrificed to the erroneous but dominant opinions of the day. Our lines are fortunately cast in pleasanter places, and if the profession can no longer be called learned in the strict sense of the term, we at least enjoy immunity from the personal risks which learning entailed on its earlier possessors.

Microscopists have run the gamut of diseases and have found germs well-nigh everywhere—even distilled water contains them. The wonder is, not that we die, but that we live. But these germs are not all of the same properties, however they may resemble each other, yet it is not given to every one to distinguish them. Cohn, says one of his admirers, is the only person who can recognise the difference of the germs. The most important results arrived at may be briefly summed up—1. The specific germs of certain specific diseases might, it was said, be artificially cultivated so that small doses of disease, or rather doses of mild disease, might be administered to healthy cattle with the result of giving immunity from that disease, just as vaccinia protects against smallpox; 2, the importation of disease, it was alleged, could be stopped, and the progress of an epidemic arrested by stamping out; 3, wounds, it was promised, would heal if germs were excluded. Alas for the stability of human hopes and beliefs! Recent statistics show that the full antiseptic precautions are a source of danger in ovariotomy; they have therefore been abandoned by the most careful and successful operator in this country, an American writer having even some time ago denounced the carbolic spray as a brush for sweeping germs into the peritoneal cavity. Quarantine has proved futile in the prevention of cholera. Stamping out is merely a temporary protection, successful only with a declining epidemic. Klein has thrown at least doubt on Pasteur's promised vaccination. You thus start on a sea of doubts and conflicting opinions which even begin at the recognition of the alleged germs. Yet so keen is the passion for speculation that Dr Carpenter, at the recent meeting of the British Association at Southport, elaborately discussed the variation of disease as a consequence of the specific variation of the germs. Two botanists whose authority on such matters is considerable, and whose acquaintance with recent research is exhaustive, indicated the want of evidence for believing in such variations so far as the lower vegetables are concerned, whatever might be

the case with bacteria. No one knows better than Dr Carpenter the difficulty of microscopic inquiry, even where the objects are colossal, as compared with the bacilli: he founed himself wrong in the identification of the so-called fossil Eozoon, which he believed he recognised in the absolutely inorganic graphic granite of Islay. How much more difficult must it be to observe and understand the life history of organisms sparsely scattered and varying from 1-15,000th to 1-25,000th of an inch—objects so small that several may be contained in a blood corpuscle. The identification of these objects is effected by staining the tissues in which they are looked for with aniline colour, treatment with acetic acid, then alcohol, then oil of cloves, finally mounting in Canada balsam, a considerable series of chemical changes being thus induced in the tissue examined, independently of those due to impurities in the re-agents. But death, the necessary preliminary of these investigations, is not in this country followed by immediate inspection of the body. We cannot tell how short an interval may suffice for the generation of these bacilli, because we do not know the relation of the bacilli to the decomposition of the fluids. A fungus grows upon dead horse hoofs—we do not see it on the living. A fungus grows on corrosive sublimate solutions, an anomaly as great as the presence of insects in the cupric sulphate solutions of Swansea: while moulds may be luxuriant on a cork floating in a jar of strong carbolic acid. Moulds form upon man, even in his life, but never unless, by starvation and confinement in vitiated air under the most depressing circumstances, he has been brought so low that decomposition of the surface has begun. It is true that the bacilli are found in the blood of sufferers from specific fevers, but before the diagnosis has been made the fever has gone so far as to have seriously invaded the nervous centres whose functional integrity is essential to the conservative power of the tissues, the power to maintain repair which shall balance waste. It is not easy to say when a man is dead: in the explosion on board the Great Eastern an engineer walked about asking attention to the other sufferers, unconscious of his own state: he fell dead, and it was found that he had been boiled over the greater part of the body, though the limits of the boiled layer barely exceeded that of the true skin. An answer to these difficulties might be found if our way was clear to the acceptance of the doctrine that a particular bacillus was the cause, say, of tubercle. But so far is this from being the case that, as I pointed out two years ago, the *prima facie* difficulty exists. Is it possible to separate the bacillus from the nitrogenous substance by whose decomposition it lives? The bacilli accompanied by a nitrogenous fluid in a state of decomposition are introduced into a

nitrogenous fluid protected against atmospheric contact: are the subsequent changes due to the bacilli, or to the decomposed fluid by which they are accompanied? If the bacilli have been artificially cultivated on nitrogenous substances, the query applies equally to them. To this query no answer has yet been given; the fallacy has not been excluded yet. The matter would be simple if all nitrogenous substances were alike; but it is not so. Analysts are now aware that two waters may contain equal quantities of organic nitrogen, yet the one shall be innocuous, the other justly credited with the origination of typhoid fever. Chemically, the two are identical; physiologically, they are quite unlike; and both contain apparently identical germs.

The spontaneous origin of specific disease has been spoken of as heterogeny or another form of spontaneous generation. The suppression of a pathological notion, fatal to a particular doctrine, has been attempted by affixing to it this nickname, just as the good man in the story, who would not kill an animal, secured his purpose by raising the cry, "Mad dog." Those who call names are implicit believers in germs, but is spontaneous origin of disease impossible? As a matter of fact, the recent outbreak of Egyptian cholera seems to have been independent of importation. The disease has occurred from time to time for years past—though the anti-English party and the believers in quarantine deny it—and its recrudescence after intervals rather suggests chemical than organic intervention. A kindred instance is furnished by the typhoid of this country. A proprietor, ashamed that a much-valued shepherd should with his family live in a thatched cottage destitute of sanitary arrangements, though within sight of his own house, kindly built a cottage with all the equipments of his civilisation. No cottage was near, no strangers came into the district, and the proprietor thought himself a good landlord and a self-sacrificing one; but he began to doubt when his shepherd and a child died of typhoid fever within three months of their occupation of the new premises. The next shepherd and his children still live, healthy, in the old cottage, which fortunately had not been pulled down. The raid upon dairies, one of the most oppressive consequences of panic, has made it clear, if sanitary officers would only state the facts intelligibly, that typhoid fever may originate spontaneously, and the contagion be distributed with the milk from the seat of outbreak, because both residents and milk have been contaminated from the same source. Dr Billings, who first gave milk a bad name after the Islington outbreak, scarcely realises the evil he has done to a trade, or the excuse for inertness with which he has supplied health officers, while he has stimulated amateur legisla-

tors, whose law is as weak as their physiological knowledge, into amusing supercession of the Home Secretary at the expense of a trade. The water supply is a frequent source of mischief. The exact determination of infective water is an inquiry still open.

Not only has it been proved that cholera has started in one locality without the importation of the disease from another locality, but there is reasonable evidence that the sufferers from one disease may start in a locality a disease of quite another sort from that under which they suffered. The typhus outbreak at Liverpool started from a ship whose crew suffered from dysentery, not typhus; that disease had not existed at the port of embarkation, and the voyage had long overlasted the ordinary period of incubation, and it is obviously not likely that rough weather, bad food, bad ventilation, and dysentery would prolong that stage. Yellow fever is another instance of the action of ochletic poison, or poison generated from the excretions of the human body. It is a poison transmissible from body to body, yet the negro is singularly exempt from it. It is peculiarly localised, occurring within the tropics, and there only in particular ports, dying out speedily when carried by a sufferer to other places; and still more interesting, a small number only of the personal attendants on the sick are affected. The whole history is strikingly in contrast with that of a germ-nurtured epidemic. It may originate, Flint says, in ships at sea; and Creighton affirms that it has done so in vessels formerly employed in the slave trade. There is reason to believe that slavers have been the means of starting this terrible scourge of the white race, though the negroes had no disease among them, just as gaol fever, a pestilent typhus, was spread in court by prisoners from crowded dungeons, and proved fatal to bench, bar, and audience though the prisoners ailed nothing. It has assuredly started also from Chinese coolie ships, though the Chinese do not enjoy the same immunity as the negroes. It is of further interest that typhus is known as ship fever in New York, where emigrant vessels have made it familiar. I lay stress on this as a point for your careful consideration, that a kind of parasitism (wholly dissimilar to that of tapeworm or scolecid, every host being a sufferer) may render a man not suffering a fountain of death to others. If he is the carrier of germs, the germs cannot have lived innocuous in his blood; they must have developed or been eliminated. If they did live without producing the specific fever, they obviously did not need a specific nourishment. It is of course easy to conjecture of temperature unfavourable for development, but these are not of value. and Koch's statement must be kept in mind that "bacteria do not occur in the blood

nor in the tissues of the *healthy* living body of man or the lower animals." This, though the conclusion is disputed by other microscopists, is an important admission pointing to the antecedent unhealth which allows the germ to enter. Now, bacilli have been found in quantities in the intestines of cholera patients, but, as Macnamara remarks, the necrotic state is sometimes marked for a considerable time before death, the proof being that food or physic has been found unassimilated, the function of digestion having terminated. Two facts regarding intermittent malarial fever where above all others bacilli are held to be potent are of extreme interest. The one is that chloroform in drachm doses curtails the cold stage and that 3.5 grains of quinia injected hypodermically have kindred effect; the other is that urethral fever is most common and paroxysmal in malarial districts. How are germs affected by these drugs or by the passage of a bougie or catheter?

In an address at the Glasgow Veterinary College in 1881 I ventured to question some of the dogmata of the germ school, not wishing to imply that germs are fanciful, but that their operation are conjectural and not so supported by consensus of observers as facts asserted to be so obvious should have been. I regret that the gap between the study of human and veterinarian medicine is still so great that the practitioners of a common profession are rarely mutually instructed. Dr Cameron the other day alluded to the honours rendered to veterinarians by Government, and to the honour which this University did itself by conferring a degree on the leading member of that department of the profession. If it were possible that Comparative Pathology should be taught, if it were in the power of a few of our students to attend such a course, the advantage to medicine would be great. Myself once on the point of becoming a teacher of Veterinary Pathology, I have ever since used all opportunities of urging on all whose time, means, and aptitude for research justified it, the vast advantage of acquaintance with disease as it is found in the lower animals. But we have no chair of human Pathology; the comparative study is yet, I fear, not an immediate prospect. I sought on the occasion referred to to recall attention to the catalytic or ferment theory of diseases, and had intended on the present occasion to discuss the source of the albuminoid matter to which specific action might be credited, typhoid fever being the instance selected. But the address of Dr Creighton to the British Medical Association, which you will find in the Journal for Aug. 4, anticipates much of what I wished to say, putting the question on a broader anatomical basis than it was in my power to suggest. It was a remarkable address, as Professor M. Foster well said, and the published work of Dr Creighton well entitles him

to a hearing when his remarks are not on the lines of the popular faith. Briefly put, his suggestion is, normal secretions may put on abnormal character—that an abnormal character once assumed, is thereafter independent of the life of the body in which matter possessing such character is found. The resistance which should restore health wastes itself on matter which has started an independent career, just as digestion has no influence on the living parasites, introduced with food into the intestine. He discusses cancer, bovine tubercle, smallpox, yellow fever, and purulent ophthalmia, and shows how innocent matter, normal secretion, may become altered and acquire infectiveness in the process. The address is one to be studied. Here I can only indicate it to you as a model of a Natural History of Disease. One of his critics, himself a supporter of the germ theory, is compelled to admit that the germs may be simply the carriers of such infective matter. Naegeli thought the contents of the bacilli were the active substance; Bergmaan and Panum obtained sepsin from putrid matter, and used it with the same results as if septic bacilli had been used for inoculation. We have thus indicated what I ventured to anticipate as the final solution of the question—viz., that the omnipresent germs owe their specificity not to their inherent specific character, but to that of the albuminoid matters in which they live. The labour spent in bringing out this result has been vast; the history of the researches, ranging over half a century, forms one of the most remarkable chapters in medicine. Every resource which science could muster has been made use of; imagination has opened up new fields of research, and conflict of opinion has been the means of throwing light on many a dark corner in Physiology and Pathology, and has hastened enormously the natural classification of disease. But the chapter is not yet closed, and I have endeavoured to point out to you the directions in which you may still find ample scope for your researches, whether in Biology, Chemistry, Pathology, or practical Medicine. I hope I have succeeded in showing how great is the dependence of medical theory on the so-called elementary sciences, and so far have held out inducements for you to pay attention to them not as compulsory work of no further use, but as valuable not merely for the knowledge they impart but also for the principles they instil. In them or in their bearings on medical practice you will find ample field for the selection of a subject which, elaborated during your student days, may, in the interval between your graduation and proceeding to the degree of M.D., receive its final form as a thesis worthy to be presented to the University, worthy of the University, and worthy of its author.